



The National Science Foundation's
**GLOBAL
SCHOOLHOUSE
PROJECT**

MEDIA ADVISORY

FOR IMMEDIATE RELEASE

The National Science Foundation's Global Schoolhouse Project

Unique government/business cooperation gives schoolchildren in California, Tennessee, Virginia, and London the opportunity to work together over a global computer network to do something about the environment.

April 28 global meeting over the Internet computer network will highlight computer-based videoconferencing as an educational tool and give students the opportunity to brief national leaders on the results of their research on how to improve environmental awareness.

In recognition of National Science and Technology Week 1993 (April 26-May 1), the National Science Foundation is sponsoring the Global Schoolhouse Project, an activity that will demonstrate how the Internet can be used to allow students all over the world to work and learn together, by communicating with each other, teachers, scientists, and national and international leaders.

The technologies involved are videoconferencing, electronic collaboration, and distance learning which use the underlying Internet network architecture to join together multiple locations. The Internet is a global "network of networks" that reaches over 10 million people in over 100 countries.

In the first occurrence of the Global Schoolhouse Project, students in fifth through eighth grade classrooms in California, Tennessee, Virginia, and London, England will work together in a study of the environment. Over the course of a six-week curriculum, they have read the book *Earth in the Balance* by Vice President Gore, conducted independent research on ground water pollution and its sources in their communities, and exchanged messages and information on their findings with each other over the Internet. The messages were composed and sent using FrEdMail (Free Educational Electronic Mail), designed especially for classroom use.

As a high point of the six-week project, the students and teachers will engage in a videoconference with each other and with national leaders in Washington, D.C. They will present their research findings and discuss ways they can continue to work together, communicating with each other using video cameras attached to personal computers using the CU-SeeMe software.

Many universities and industrial firms, as well as the local schools involved in the project, have worked with the National Science Foundation to develop the government, industry, and university partnership to facilitate this demonstration project. This partnership brings together the key technical components and personnel needed to integrate the technologies and make the Global Schoolhouse Project a current reality. It is contemplated that the project may expand in future years to include additional classrooms, other guests, and further advanced and improved technologies.

For more information, or to observe this exciting educational activity, contact any of the people listed on the enclosed sponsor contact sheet.



The National Science Foundation's **GLOBAL SCHOOLHOUSE PROJECT**

IN A NUTSHELL

What is the Global Schoolhouse Project?

- The Global Schoolhouse Project involves children in California, Virginia, Tennessee, and London. The children have done research on the environment and use videoconferencing over the global Internet computer network to communicate with each other and national and international leaders.

What are the key themes?

- The Global Schoolhouse Project is an ongoing activity, not a one-time demonstration. The Project uses the Internet infrastructure and provides students with new tools and resources for education.
- The April 28 videoconference on the Internet is part of the National Science Foundation's National Science and Technology Week, a week of celebration and activities to promote scientific literacy among children and adults.
- The Global Schoolhouse Project is an outstanding example of government, business, and the educational community working together for a common goal. Long-term loans and donations of substantial amounts of equipment and services have made this project a reality.

What are the new technologies being shown?

- The Global Schoolhouse Project demonstrates the use of videoconferencing on personal computers over the Internet. Cornell's CU-SeeMe software allows students to sit down at an Apple Macintosh and work with students in other locations.
- In California, project participants are highlighting the use of the Switched Multimegabit Data Service (SMDS), a technology being widely deployed by telephone companies to provide high-speed, low-cost switched data services.

How does the project leverage on an existing network infrastructure?

- The Global Schoolhouse Project uses the underlying Internet infrastructure to move information around. Because such an infrastructure is already in place, projects like the Global Schoolhouse can quickly and easily be put together.
- The Global Schoolhouse Project demonstrates how networks sponsored by the government, such as the NSFNET, integrate easily and seamlessly with commercial networks such as SprintLink and CERFnet to form a national infrastructure.

What are the implications for education?

- Videoconferencing over the Internet is a key technology for students to communicate with each other and with educators, policy makers, scientists, and many other resources around the world. The network technology opens up the classroom, allowing students and teachers to take advantage of databases and people previously unavailable to them.

What are the implications for technical policy makers?

- The Global Schoolhouse Project demonstrates the use of video over the Internet. Increasingly, the Internet is being used by many diverse populations as a key part of their personal and professional lives. Projects such as the Global Schoolhouse Project show that the networks are able to provide leading-edge support for multimedia, on-line libraries, and a host of other new applications.

What are the implications for general policy makers?

- The Global Schoolhouse Project shows how elementary students can talk to each other and policy makers. Many other populations of users are also on the Internet, including scientists, university students, corporate executives, librarians, and a wide range of other groups. Videoconferencing over computer networks provides a unique opportunity for policy makers to talk to the general public, forming the basis for an Internet Town Hall.



The National Science Foundation's **GLOBAL SCHOOLHOUSE PROJECT**

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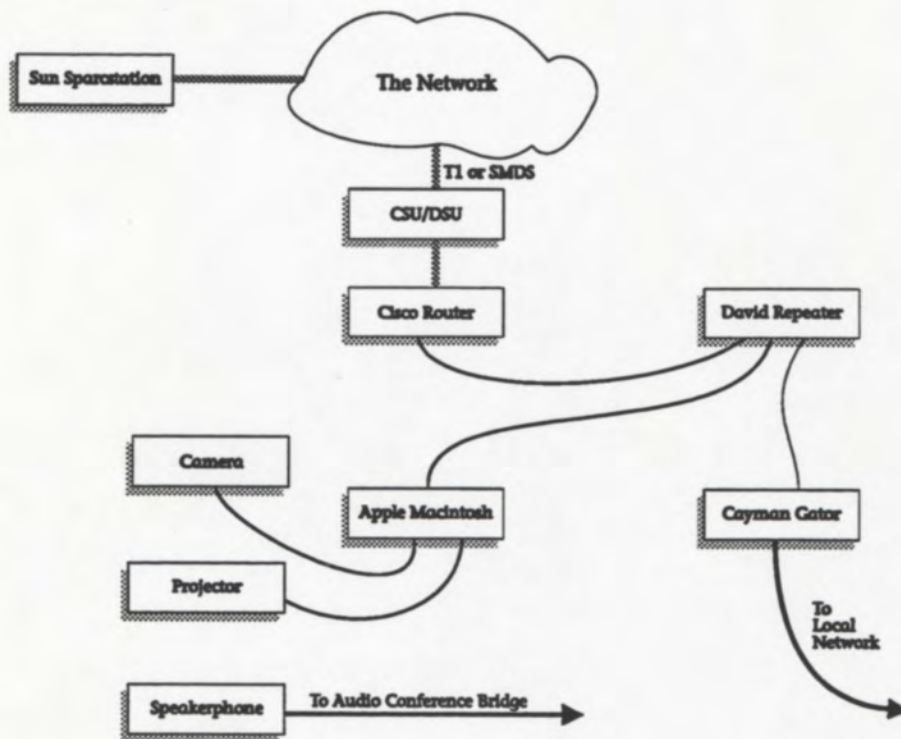
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EQUIPMENT OVERVIEW



Notes

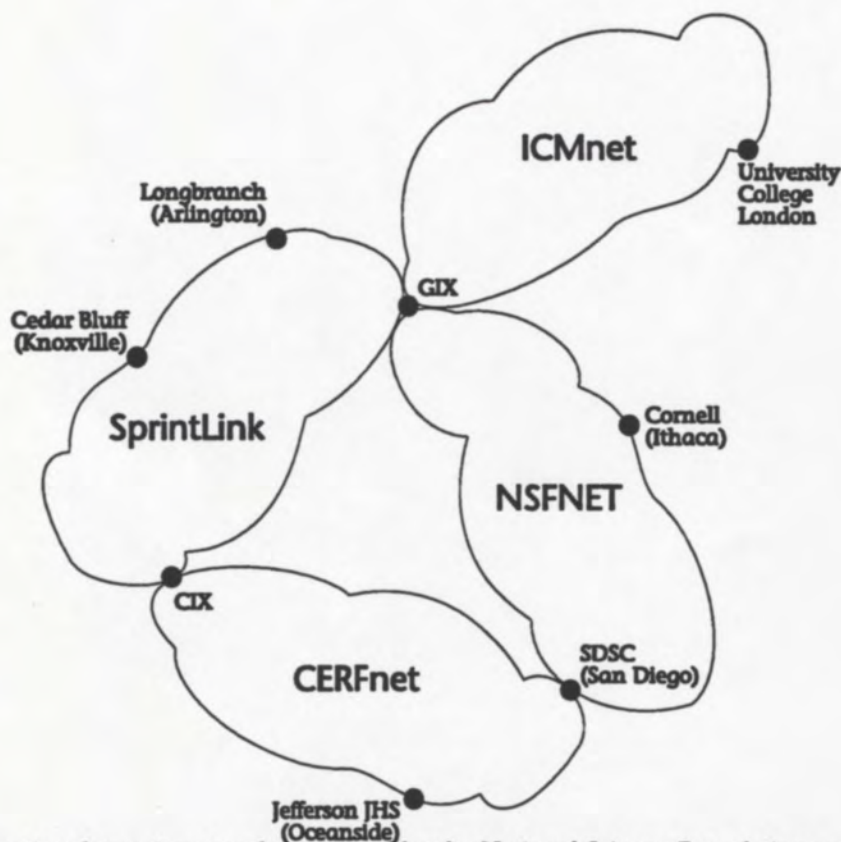
- Students use an Apple Macintosh running the Cornell CU-SeeMe software. The software puts a window on the screen for each site with which the student is communicating. Students also use a variety of other software, such as FrEdMail for composing and sending electronic mail messages.
- The desktop computer has a video camera and a projector connected to the screen. The video camera takes the live action and makes it available to the computer. The projector takes the information on the screen and blows it up for easier viewing by a large audience.
- Audio for the videoconference is provided by a traditional audio conference bridge. Traditional telephone facilities such as the conference bridge are able to easily coexist with the computer-based technologies.
- A Sun Sparcstation acts as a reflector, taking the video images from one site and sending them to the other sites involved in the videoconference.
- A Cisco router provides the main gateway between the local network and the Internet. The access method to wide-area facilities can be traditional data communications lines (e.g., T1) or newer technologies such as SMDS. The device that provides the interface to the T1 or SMDS line is a CSU/DSU. The David Systems Ethernet repeater acts as the wiring hub for the local network.
- In some cases, the local network has an additional gateway from the main local network onto an educational network. For example, the Oceanside site uses a Cayman "Gator Box" to provide a link to an Apple-Talk network.
- *Many* other vendors provided cable, technical assistance, facilities, data services, and *many* other resources. The names of vendors included on this information sheet are simply meant to help illustrate concepts in the Global Schoolhouse Project and are not meant to imply endorsement or relative importance.



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NETWORK TOPOLOGY

Notes



- NSFNET is a national transit network sponsored by the National Science Foundation and operated by Advanced Network and Services, Inc. The NSFNET links regional networks around the country with a 45 Mbps national backbone. The NSFNET also has direct links to supercomputer centers, such as the San Diego Supercomputer Center (SDSC).
- The International Connections Manager network (ICMnet) is sponsored by the National Science Foundation and operated by Sprint. ICMnet provides global connectivity services in Europe, South America, and Asia.
- Many commercial and federally-sponsored networks join together in Washington at the Global Internet Exchange (GIX), a common point of interconnection running over a fiber plant provided by Metropolitan Fiber Systems. The Commercial Internet Exchange (CIX) provides a similar point of interconnection for commercial Internet networks.
- SprintLink and CERFnet are both commercial Internet networks, providing national and regional services to their customer base in universities, corporations, and other institutions.
- The four schools in London, Arlington, Knoxville, and Oceanside all use this common infrastructure to communicate with each other. Data packets go from the school to a *reflector site* in Washington, D.C. The reflector takes video data from one site and reflects to the other three sites.
- A second reflector is located in Ithaca, New York at Cornell University. This second reflector sends copies of the video data down to a viewing site in Vienna, Virginia where guests can monitor the videoconference. The second reflector also sends the video data out over the Multicast Backbone, a collection of sites around the world that cooperate for global videoconferences at special events.







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NSFNET

NSFNET is a vital component of the aggregate of electronic networks which links the research and education communities throughout the U.S., and which in turn is part of the worldwide collection of networks referred to as the Internet. The NSFNET Backbone is a network funded by the National Science Foundation and managed and operated by Merit Inc, a not-for-profit consortium of Michigan universities, which has subcontracted the network operations to Advanced Network & Services Inc (ANS). The NSFNET Backbone links 19 sites within the U.S.A. to which are connected various mid-level networks which receive funding from federal, state, local and private sources. These in turn connect local networks at schools, universities, libraries, research laboratories, government facilities and supporting commercial organizations. This co-operative national grid of electronic links allows U.S. researchers and educators to use remote facilities and to communicate their work to their colleagues not only in the U.S. but also throughout the world.

NSFNET came into existence in 1986 originally as a network intended to provide US researchers with remote access to the NSF supercomputer sites which had been set up across the country. However network usage rapidly broadened to other applications, giving rise to explosive growth of traffic. In August 1988 a total of 40 Gigabytes were transmitted on the NSFNET Backbone. By March 1993 this monthly traffic had increased more than 150-fold to 6.5 Terabytes. In recent months the average growth rate has been 11% per month. To accommodate this spectacular growth the NSFNET Backbone underwent hundreds of minor engineering improvements plus two major upgrades bringing the line speeds from an initial 56 Kbits per second to the current 45 Mbits per second.

Other significant measures of the size and success of the NSFNET project include:

- More than 10,000 regional, state and local networks domestically and internationally registered with NSFNET as of March 1993;
- More than 800 of the approximately 4000 two-year and four-year colleges and universities in the nation interconnected;
- Many more than 1000 high schools also connected, a number difficult to estimate since regional networks tend to connect such institutions without any direct involvement of NSF.

Today, NSFNET is more than just the links that connect together the national infrastructure. It also includes an international connections program plus services to help make the entire Internet, not just NSFNET, a powerful and friendly tool for the millions of users on it every day. Internationally, 55 countries are directly accessible from NSFNET via the Internet, and about 50 others can be reached via electronic mail through electronic gateways. Several more countries will be added during the coming year. A major NSFNET service is the InterNIC, which is managed cooperatively by three separate organizations to maintain a registry of networks connected to the Internet, to act as an information center of first and last resort, and to provide a directory and database management service. Yet another service is the Clearinghouse for Networked Information Discovery and Retrieval to assemble, disseminate and enhance publicly available network tools, tools which enable network users to seek out publicly available information stored remotely and to download that information to their own sites.

Looking to the future, the NSFNET service is expected to evolve into one where the backbone network as we see it today will no longer exist. Instead NSF hopes to fund and support a series of Network Access Points (NAPs) to which regional networks would be connected, a Routing Arbiter to manage efficient routing of traffic over the networks, and a very high speed Backbone Network Service (vBNS) for specialized research applications that need high speed access to and from supercomputer centers. In essence the NSFNET program will continue to support the national network infrastructure as well as the development of leading edge network technology.

CORNELL PROVIDES SOFTWARE FOR INTERNET VIDEO CONFERENCES

ITHACA, N.Y. — When four grade school classes, from California to London, hold a computer-assisted videoconference later this month (April) as part of National Science and Technology Week, they will be using software developed at Cornell University to cut the cost of remote visual connections.

The software, called CU-SeeMe, requires a Macintosh computer connected to the worldwide computer network known as the Internet and commonly available networking software. Beyond that basic configuration, a receiver of images needs only CU-SeeMe. A sender needs an inexpensive video camera and video processing technology; total costs need not exceed a few hundred dollars in addition to the Macintosh. The software enables Internet users to receive a small black-and-white video image on their Macintosh computer screens. The technology is designed to provide low-cost video conferences, according to M. Stuart Lynn, vice president for information technologies at Cornell. Audio must be carried by telephone, but developers of the software expect to incorporate audio as the software is enhanced.

When development of CU-SeeMe began in July 1992, the only videoconferencing software for the Internet required expensive hardware, which severely limited the number of potential senders and receivers. By opening Internet videoconferences to Macintosh users, Cornell Information Technologies (CIT) hopes to accelerate the adoption and usefulness of this technology. Third parties have expressed interest in writing versions of CU-SeeMe for PCs, said Lynn.

The software can support eight conferees simultaneously. Program developer Tim Dorcey, a senior technical consultant with CIT, said six individuals in Ithaca, New York City, Washington, D.C., and Vancouver, Canada, recently held a video conference with the software.

The Cornell Medical College also used CU-SeeMe to conduct interviews with three applicants for computer support positions, Dorcey said. Potential uses of CU-SeeMe range from transmitting medical or scientific visual information to monitoring a high-security environment from a remote location to watching the progress of a laboratory experiment from the comfort of home, he added.

Current limitations on image processing and network carrying capacity (or bandwidth) limit the maximum size of the video image to 4.5 by 3 inches. Improvements to network bandwidth and video compression technology could greatly enhance the technology, Dorcey said.

CU-SeeMe is publicly available at no cost. The software is still under development. Receivers require a Macintosh platform with a 68020 processor or higher, system 7 or higher, MacTCP and the ability to set the monitor to 16 gray scale. Senders require the above specifications, Video Spigot hardware, a camcorderlike camera [with NTSC 1vpp output and an RCA cable], Quicktime and a SpigotVDIG Quicktime driver. For more information contact Richard Cogger, Cornell Information Technologies, (607-255-7566) or (R.Cogger@cornell.edu).



FrEdMail Foundation

P.O. Box 243 • Bonita, California 92002-0243 • 619-475-4852

The FrEdMail (Free Educational Mail) Network is a growing, distributed, and low-cost telecommunications network that helps teachers and students participate in a wide variety of collaborative learning experiences. FrEdMail activities motivate students to become better learners and writers. It also enables educators to share their experiences and curriculum ideas, distribute teaching materials, promote the development of effective reading and writing skills, and obtain information about workshops, job opportunities, legislation affecting education, and other timely topics. The FrEdMail Network was founded in 1984 for educators to promote communication skills and to encourage geographical, cultural, and socio-political understanding on a global scale.

The FrEdMail Foundation offers a variety of resources and training assistance:

Workshops and On-line Courses

Hello Internet

Hello Internet is a comprehensive workshop, conducted on site or on-line, which introduces teachers to Internet resources useful to classroom learning applications.

Managing Global Learning Projects

Managing Global Projects is a workshop which equips teachers with the skills and resources to plan, organize, and conduct their own collaborative on-line learning projects.

Printed Resources

TeleSensations: Educators' Handbook for Instructional Telecomputing

TeleSensations is a resource binder containing over 100 telecomputing activities that you can conduct with your students on-line, as well as a potpourri of helpful technical and procedural information, tips, and advice.

T 'n T: Telecomputing and Teachers

T 'n T: Telecomputing and Teachers is a complete 15-hour teacher training syllabus, especially designed for district resource specialists, staff trainers, and others charged with training staff in how to use telecomputing.

FrEdMail Newsletter

The FrEdMail Newsletter, published 2-4 times each year, provides successful telecomputing project summaries, classroom management strategies, and project coordinator insights.

Videos

"Bringing the Information Age Home," an excellent presentation produced by Pacific Bell showing the potential of electronic communications in an information age. The FrEdMail Network, state legislators, weather services, and SeniorNet are highlighted.

"New Connections," one of the most effective video presentations of successful classroom integration of telecomputing. This video, produced by Prodigy, makes the concept of classroom telecomputing very understandable and has high emotional appeal.

"Teachers and Telecomputing," FrEdMail's own training video which features real teachers and students describing basic hardware and software needs, how to conduct successful projects, and integration of telecomputing at the site and district level.

FrEdMail *Linking Students and Educators Around the Globe*



FrEdMail Foundation

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The Global School House Project

Student Ambassador's For Environmental Reform (S.A.F.E.R.)

The long-distance collaborative learning project featured in the National Science Foundation's first Global School House demonstration was designed and coordinated by the FrEdMail Foundation, under the direction of Yvonne Marie Andrés.

FrEdMail's "S.A.F.E.R. Water Project" linked students at Jefferson Junior High, Oceanside, CA, Cedar Bluff Middle School, Knoxville, TN, Longbranch Elementary, Arlington, VA, and Oldfield House School, Hampton, UK. From these sites the students studied their local water environments. Students shared their findings with one another via Internet email and in a live interactive video teleconference conducted on the Internet. Their shared research and idea exchanges enhanced each local action plan for community awareness. Working together, students in the four schools produced a collaborative Environmental Newsletter, a 1994 watershed pollution prevention calendar comprised of photos, drawings, and slogans contributed from each site, and a brief video tape of the project and its results on community awareness.

The S.A.F.E.R. Water Project is just one of the many projects conducted by the FrEdMail Foundation on the FrEdMail Network and on the Internet through FrEdMail's SCHLnet service. As a non-profit educational foundation, The FrEdMail Foundation provides a variety of low-cost services to teachers and schools on the Internet to help teachers conduct useful, curriculum-based learning activities for their students. Al Rogers, Executive Director of the Foundation, observes that many teachers coming to the Internet are confused by the plethora of resources available and are unsure of how to integrate these resources into the academic life of their classroom. "The FrEdMail Foundation seeks to meet this need," Rogers says. "We show teachers how to explore the power of the Internet as a useful learning tool. We provide teacher training and how-to articles, ideas and resources for classroom applications, collaborative learning projects, and free on-line consulting services to subscribing teachers who want to organize their own projects."

The S.A.F.E.R. Water Project Environmental newsletter, calendar, and video are available from the FrEdMail Foundation.

You may send email requests for more information about any products, services, or resources listed, to:

SAFER@ACME.FRED.ORG

FrEdMail *Linking Students and Educators Around the Globe*

International Connections Manager Network (ICM-Net)

The National Science Foundation (NSF) is responsible for fostering, promoting, and facilitating communication and collaboration among members of the U.S. scientific research and education community as well as with their colleagues abroad. In an effort to ensure reliable connectivity between the U.S. and the national research and academic networks of countries with which the U.S. community maintains scientific collaborations, the NSF solicited proposals from offerers who could facilitate such "International Connections Management".

In 1991, Sprint was awarded a cooperative agreement with the NSF to provide integrated management of such international data networking connections to the U.S. Today, Sprint provides connectivity between foreign networks and the NSFNET backbone via two "International Connections Manager" Networks (ICMnet-Atlantic and ICMnet-Pacific) to facilitate this objective. The following describes each of these networks:

ICMnet-Atlantic

This network currently provides routing service between NSFNET and NORDUnet (Nordic countries), RENATER (France), the United Kingdom, Germany, South Africa, Kuwait, Turkey, Costa Rica, and Ecuador, with numerous additional connections planned for implementation during 1993.

ICMnet-Atlantic connects to NSFNET and other Federal Networks, such as NASA Science Internet, Energy Sciences Network, MILnet, and others at the Federal Internet eXchange-East (FIX-E) in College Park, MD. ICMnet-Atlantic is also connected to the Washington, D.C. Metropolitan Area Ethernet (MAE-East) where it connects with such commercial providers as Alternet, PSInet, and SURAnet over a 10Mbps ethernet.

ICMnet-Atlantic routing to Europe is coordinated with the European Backbone (EBONE) which is a cooperative effort among several European national networks. ICMnet-Atlantic obtains trans-Atlantic back-up from Alternet/EUnet and ANS/EASInet.

ICMnet-Pacific

This network currently provides infrastructure and routing service between NSFNET in the U.S. and both the National Center for Science Information Systems (NACSIS) in Japan and the Malaysian Institute of Microelectronic Systems (MIMOS) in Malaysia. Sprint also plans to establish connections to the Philippines and other Pacific Rim destinations in 1993. ICMnet-Pacific connects to NSFNET and to other Federal Networks at the Federal Internet eXchange-West (FIX-W) located at NASA-Ames Research Center in Moffett Field, CA. Most nations in the Pacific Rim area are available via this path into PACCOC to include the countries of Korea, Hong Kong, Australia, and New Zealand.

In the spirit of the cooperative agreement, Sprint also provides international routing services to other national interests in Japan and India via the SprintLink Public Data Internet. Service to sites in the Former Soviet Union is planned for delivery in late 2Q93.

Anyone seeking more information on the Sprint/NSF International Connections Management program should contact Mr. Robert D. Collet, Sprint's Principal Investigator on (703) 904-2330 (Internet e-mail address: <rcollet@icm1.icp.net>).

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National Science Foundation



For Immediate Release

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NATIONAL SCIENCE & TECHNOLOGY WEEK '93 HIGHLIGHTS YEAR OF SCIENCE AWARENESS

Science and Technology Are Everywhere Is 1993 Theme

The National Science Foundation (NSF) joins public and private organizations and businesses nationwide to sponsor **NATIONAL SCIENCE & TECHNOLOGY WEEK '93**, April 25 - May 1, a week of celebration and activities to promote scientific literacy among children and adults.

"Science and Technology Are Everywhere is our theme this year," said Walter Massey, Director of the National Science Foundation, "because our aim is to demonstrate the extraordinary impact of science and technology on our everyday lives. We want to awaken people's natural curiosity — especially the curiosity of children."

"**NATIONAL SCIENCE & TECHNOLOGY WEEK '93** will also introduce an international component," said NSTW Coordinator Mary Bullock, "designed to increase opportunities for experiences in science and technology. Those experiences can influence career choices, as familiarity with technology becomes a necessity. We're also developing a 'North American Alliance' for 1994 which will tie together major NSTW events in the United States, Canada and Mexico."

Highlighting **NATIONAL SCIENCE & TECHNOLOGY WEEK '93** is the 1993 Presidential Awards for Excellence in Science and Mathematics Teaching, a week-long tribute to 200 elementary school teachers, brought to the nation's capital in recognition of their exemplary service to education. Among the NSTW-related activities planned: an April 29 Capitol Hill breakfast with Congressional representatives, a White House Rose Garden presentation ceremony, and a formal dinner at the State Department.

NSTW '93 activities around the country range from an Arkansas Science & Technology Career Expo to a "Science Day" in Idaho — featuring bridge-building and egg-drop competitions and hands-on experiments in chemistry and physics — to a Science Trek Workshop for 1000 4-6th grade students, their teachers and parents in Maryland.

NSTW '93 will mount a national Head Start initiative with introductory science activities for Pre-K education, as well as a brochure for parents and other childcare providers.

(more...)

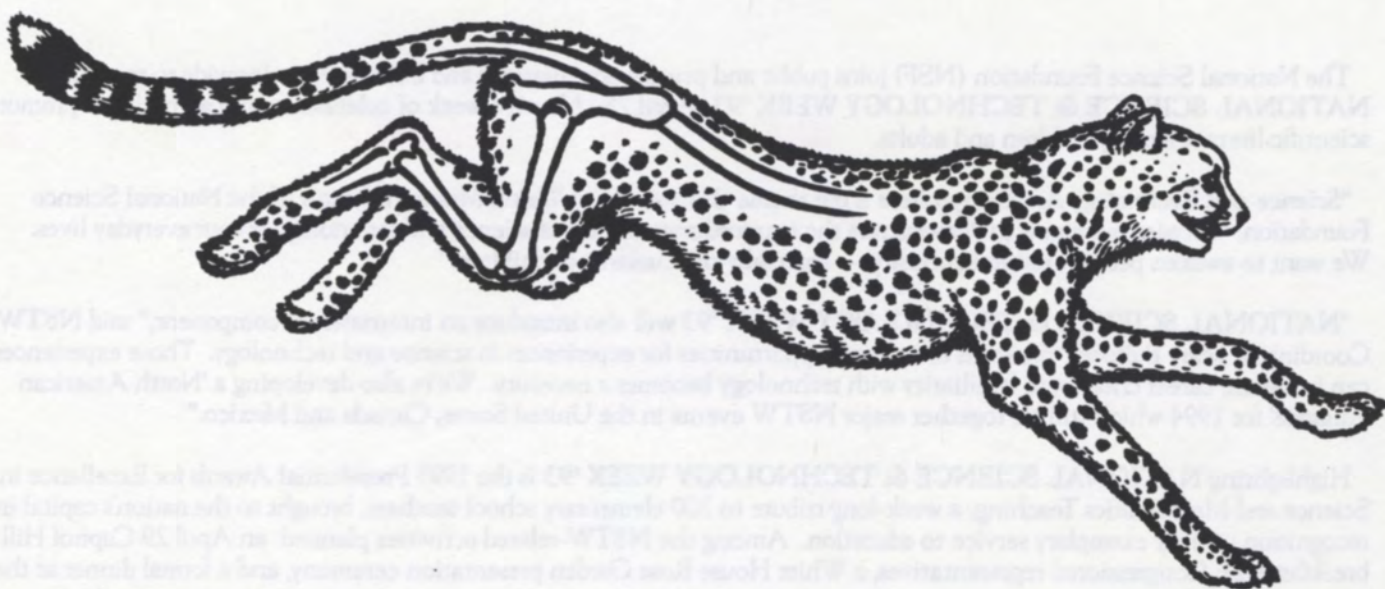


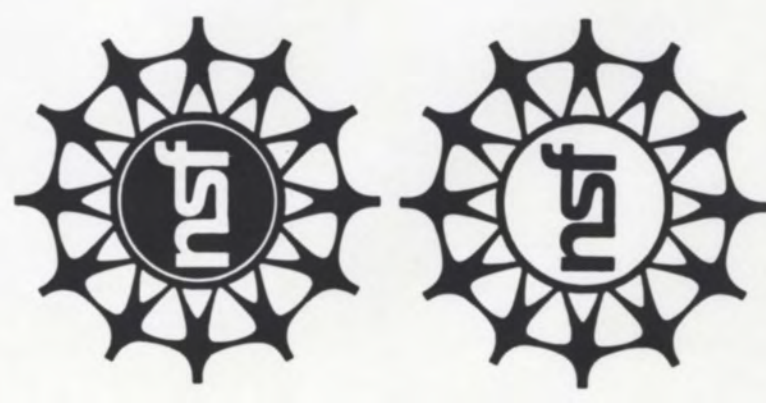
Office of Legislative and Public Affairs

One of NSTW's major annual activities is The Benjamin Franklin Event/Family Science Night, to be held this year on April 28 at the National Zoo in Washington, D.C., where children, science educators and government officials are invited to enjoy numerous demonstrations and interactive exhibits that provide understanding of species management and other aspects of biodiversity.

The National Science Foundation collaborates throughout the year with a nationwide network of schools, museums, universities, community groups, professional organizations, corporations, and state and local governments to offer NSTW educational materials, teacher-training workshops, and a broad range of locally-tailored programs that promote the understanding of science. NSF, an independent agency of the federal government, promotes and advances scientific progress and understanding in the United States by competitively awarding grants to educational institutions for research and education in the sciences, mathematics and engineering.

NSTW '93 Corporate Sponsors: AT&T, Ford Motor Company, IBM, and Miles Inc. NSTW '93 Association Sponsors: American Chemical Society, American Federation of Teachers, Chemical Manufacturers Association, and Edison Electric Institute.





April 25th
to
May 1st
1993

Science & Technology Are Everywhere
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